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Chiropractic management of a US Army veteran with low back pain and piriformis syndrome complicated by an anatomical anomaly of the piriformis muscle: a case study

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Abstract

Objective: The purpose of this article is to present the case of a patient with an anatomical anomaly of the piriformis muscle who had a piriformis syndrome and was managed with chiropractic care.

Case Report: A 32-year-old male patient presented to a chiropractic clinic with a chief complaint of low back pain that radiated into his right buttock, right posterior thigh, and right posterior calf. The complaint began 5 years prior as a result of injuries during Airborne School in the US Army resulting in a 60% disability rating from the Veterans Administration. Magnetic resonance imaging demonstrated a mildly decreased intradiscal T2 signal with shallow central subligamentous disk displacement and low-grade facet arthropathy at L5/S1, a hypolordotic lumbar curvature, and accessory superior bundles of the right piriformis muscle without morphologic magnetic resonance imaging evidence of piriformis syndrome.

Intervention and Outcome: Chiropractic treatment included lumbar and sacral spinal manipulation with soft tissue massage to associated musculature and home exercise recommendations. Variations from routine care included proprioceptive neuromuscular facilitation stretches, electric muscle stimulation, acupressure point stimulation, Sacro Occipital Technique pelvic blocking, CranioSacral therapy, and an ergonomic evaluation.

Conclusion: A patient with a piriformis anomaly with symptoms of low back pain and piriformis syndrome responded positively to conservative chiropractic care, although the underlying cause of the piriformis syndrome remained.

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Introduction

Piriformis syndrome is an uncommon cause of low back pain and sciatica that results from entrapment and/or irritation of the sciatic nerve in the region of the greater sciatic foramen.[1-4] Although no definitive causative factors are known for this syndrome, the usual source is thought to be an abnormal condition of the piriformis muscle. A common basis of the problem appears to be trauma to the piriformis muscle that results in spasm, edema, and contracture of the muscle, which can cause subsequent compression and entrapment of the sciatic nerve.[2] Other possible etiologies include reflex spasm of the piriformis muscle and an abnormal course of the sciatic nerve through the piriformis muscle. Altered biomechanics of the lower limb, low back, and pelvic regions can lead to stretching and shortening of the piriformis muscle, which can also lead to piriformis syndrome. Although, in 1928, Yeoman[5] first described the clinical picture of what would later be called *piriformis syndrome*, this diagnosis still remains somewhat controversial. This controversy stems from several factors that include variable and sometimes unclear cause, similarity to other more easily recognizable causes of sciatica, lack of consistent objective diagnostic findings, and relative rarity. Piriformis syndrome had been thought to be a purely clinical diagnosis; but more recently, magnetic resonance imaging (MRI) has begun to be used to help with the diagnosis of this problem.[6]

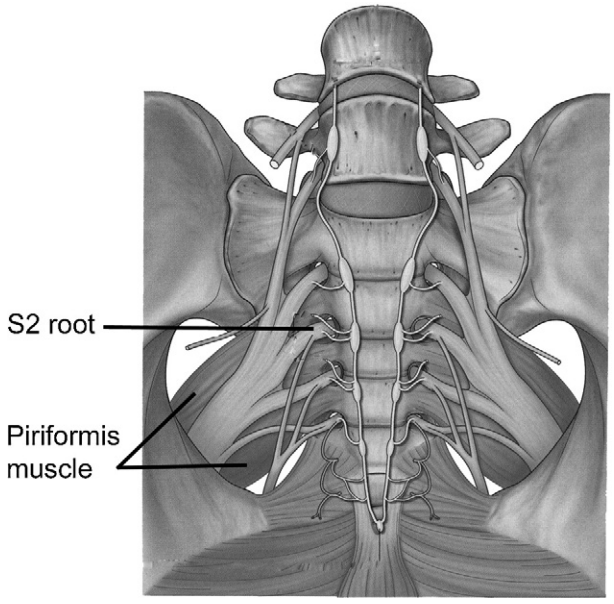

Fig 1. An anterior view of pelvic region showing the normal origin of the piriformis muscle in relation to the anterior sacral spinal nerve roots. (Reprinted with permission from Drake RL, Vogl W, Mitchell AWM, *Gray's Anatomy for Students*, Elsevier Churchill Livingstone: Philadelphia, 2005.)

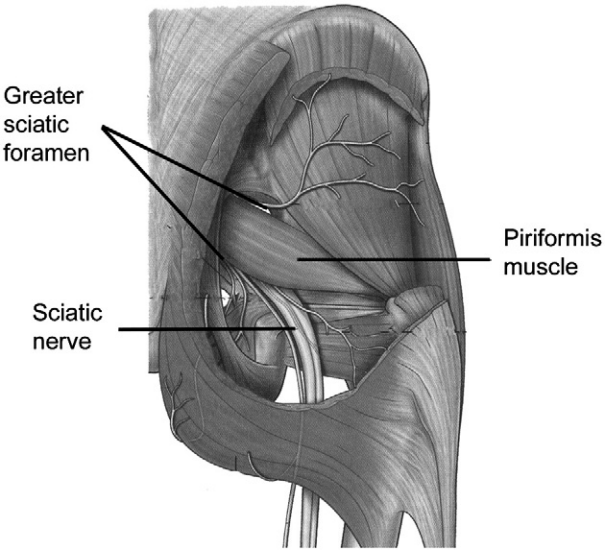

Fig 2. A posterior view of the pelvic region showing the normal relationship of the piriformis muscle and the sciatic nerve as they exit the pelvis through the greater sciatic foramen. (Reprinted with permission from Drake RL, Vogl W, Mitchell AWM, *Gray's Anatomy for Students*, Elsevier Churchill Livingstone: Philadelphia, 2005.)

The piriformis muscle is a pear-shaped muscle in the gluteal region that lies inferior to and in the same plane as the gluteus medius muscle. Normally, the piriformis muscle arises from the anterior surface of the second through fourth sacral segments in the regions between and lateral to the anterior sacral foramina (Fig 1). It also arises from the superior margin of the greater sciatic notch, the anterior sacroiliac ligament, and sometimes the anterior surface of the sacrotuberous ligament. The piriformis muscle exits the pelvis through the greater sciatic foramen, which it mostly fills, to insert on the upper border of the greater trochanter of the femur. Usually, the sciatic nerve emerges from the greater sciatic foramen inferior to the piriformis muscle (Fig 2). There are several variations on this relationship that have been described.[7] The most common variation, which occurs in more than 10% of the population,[8] is that the common fibular portion of the sciatic nerve emerges through the piriformis muscle. Interestingly, a recent meta-analysis suggests that variations in how the sciatic nerve exits the pelvis through the greater sciatic foramen in relation to the piriformis muscle present no increase in risk of piriformis syndrome.[9]

The authors were unable to locate any studies that addressed conservative management of a patient with

accessory superior bundles of the piriformis muscle. One case study was found in which a patient was treated for posttraumatic piriformis syndrome with successful resolution of symptoms after treatment for 5 months.[12] Another case study describes a patient with sacroiliac joint dysfunction with associated piriformis syndrome that mimicked an intervertebral disk syndrome.[13] The purpose of this article is to present the case of a patient with an anatomical anomaly of the piriformis muscle that had a piriformis syndrome and was managed with chiropractic care.

Case report

A 32-year-old man reported to a private practice chiropractic clinic with a chief complaint of low back pain, which began 5 years prior as a result of injuries during Airborne School in the US Army resulting in a 60% disability rating from the Veterans Administration. The patient noted that most activities increased his pain, whereas stretching, massage, ice, heat, prescription muscle relaxers, and over-the-counter medications decreased his pain. He said that it varied greatly throughout the day. The patient described his lower back pain as achy and stabbing on a pain chart. The patient completed a numeric pain rating scale and noted his low back pain to be 4/10 at best and 8/10 at worst. He mentioned that it was located across his belt line, descended into his right buttock and right posterior thigh, and ended in the middle of his right calf. The patient indicated a secondary complaint of tension-type headaches approximately 2 or 3 times per month, which he had been experiencing for the past 5 years. The patient gave signed consent to have his personal health information used without divulging personal identifiers for the purpose of this article.

The patient's medical history and family history were unremarkable other than a left foot fracture, left medial meniscus tear, and left plantar fasciitis. The patient is an attorney and spends 8 to 10 hours per day working on a computer at his desk. The patient mentioned an exercise routine that includes cardiovascular and weight training. He noted a side-sleeping posture with a pillow between his knees.

Objectively, he appeared to be in good health, alert, and cooperative at the time of examination. Postural analysis revealed an increase in the lumber lordosis and high left iliac crest. Spinal examination demonstrated a decrease in lumbar flexion and right lateral flexion. Pain was present in the right lumbar region with left lateral flexion. Result of the Kemp test was positive on the right and left for central lower lumbar pain, result of the FABERE (flexion, abduction, external rotation, and extension) test was positive on the left and right, and straight leg raise caused central lumbar pain only. Results of the Gaenslen, Dejerine Triad, FAIR (flexion, adduction, and external rotation) test, and Valsalva were negative. Neurologically, he was intact. Soft tissue palpation revealed hypertonicity with multiple trigger points in the right hamstring and bilateral lumbar extensors. Decreased joint motion was present at L4 and the right sacroiliac joint. Examination for the secondary complaint of headaches did not reveal any noticeable link between the headaches and the low back pain.

Under previous medical care, the patient had an MRI of the lumbar spine without contrast performed 18 months before the start of care at this clinic. This study was ordered because the patient was reporting low back pain and right lower extremity pain as a result of his falls in Airborne School. Results of the MRI, provided a few days after the patient's initial visit to this facility, indicated a mildly decreased intradiscal T2 signal with shallow central subligamentous disk displacement and low-grade facet arthropathy at L5/S1, a hypolordotic lumbar curvature, and accessory superior bundles of the right piriformis muscle without morphologic MRI evidence of piriformis syndrome (Fig 3). These accessory fibers were arising from the anterior inferior-lateral portion of the first sacral segment and covered the second anterior sacral foramen on that side. With this arrangement, the S2 rootlets emerging from the foramen must pass through this portion of the piriformis muscle. It is important to note that, at the time of the MRI, these bundles did not appear to impinge directly on any nerve roots, although they

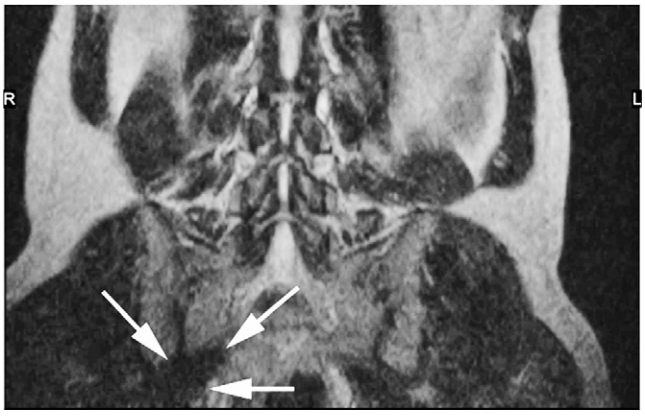

Fig 3. Magnetic resonance imaging scan of the patient in this report showing the accessory bundles of the right piriformis muscle (arrows).

were in a position to do so. It is known that, with this arrangement, even though the patient may be exhibiting symptoms of piriformis syndrome (eg, low back pain and sciatica), the sciatic nerve may appear as normal in size and signal characteristics on MRI.[2] This may be due to the fact that piriformis syndrome may be a functional entity in which the nerve is only compromised in certain postures or activities.

The patient was diagnosed with displacement of the L5 intervertebral disk without myelopathy and degenerative joint disease of the L5 facets. The incidental finding of accessory superior bundles of the right piriformis muscle was not considered as symptom producing at the time of initial presentation of the patient and did not originally impact the treatment plan. The difference between the objective finding of lumbar hyperlordosis and MRI finding of lumbar hypolordosis was thought to arise from hypertonicity of the lumbar paraspinal muscles. On the other hand, it could be a positioning issue during the MRI examination, during which the patient is usually placed supine with hips and knees flexed. The patient preferred a conservative approach and was not interested in surgical intervention. The patient received high-velocity, low-amplitude spinal manipulation to one or more of the following on each visit: the right sacroiliac joint, the left sacroiliac joint, L5, and/or L4. The decision to perform spinal manipulation was based on subjective complaint at the time of visit as well as static and motion palpation. The patient was instructed on proper stretching techniques for the lumbar extensors, hamstring, and gluteal muscles. Soft tissue massage to the lumbar extensors was included at each visit as well as home exercise recommendations to strengthen the abdominal and pelvic regions. All assessments and treatments were provided by the same chiropractic physician. The patient responded well to the first 4 visits and ceased to report his low back as a primary complaint. His numeric pain rating scale for his low back was 0/10. Objectively, his lumbar extensor hypertonicity was resolved. There was still some loss of joint motion in the right sacroiliac joint and L5. He continued a course of treatment for headaches.

The patient experienced his first reexacerbation of low back pain 3 months after the initiation of care. Since his first presentation of low back symptoms at this chiropractic clinic, approximately 4 years ago, he has had several episodes of low back pain, with each episode demonstrating a decrease in symptoms within 1 to 3 treatments. At initial evaluation, it was determined that no symptoms were directly related to piriformis syndrome.

Approximately 6 months after the start of care, the patient presented with a different clinical picture. This episode was marked by low back pain that also involved subjective and objective findings suggestive of piriformis syndrome. The patient was not able to articulate any mechanism of injury to explain the change in symptoms. Subjective findings of piriformis syndrome at this time included mostly pain descending into the buttock, posterior thigh, and leg. Objective findings consisted of reproduction of symptoms with passive flexion, adduction, and internal rotation of the right hip, known as the *Piriformis Test*, and palpable hypertonicity of the piriformis muscle with pain. A second episode of piriformis syndrome occurred approximately 24 months after his initiation of care.

A new treatment plan was incorporated when the patient presented with piriformis syndrome symptoms. In addition to high-velocity, low-amplitude spinal manipulation of the right sacroiliac joint, left sacroiliac joint, L5, and/or L4 as needed, determined by motion and static palpation, additional treatments were used. The first of these was proprioceptive neuromuscular facilitation stretches to assist in hamstring flexibility. In this procedure, the patient was placed in a supine position with the patient's knee extended and leg extended upward and held in place at the calf and ankle by the treating chiropractor. The patient was instructed to press his leg against the chiropractor's cephalad resistance for 10 seconds. The patient was then told to relax, and the chiropractor stretched the hamstring muscle slightly more for 10 seconds. This cycle of push and relax was repeated 3 times. Electric muscle stimulation was also used to decrease the pain symptoms referring to the right gluteal region. Four electrodes were used in a quadpolar positioning diagonally from each other in the lumbar and gluteal region to create an interferential waveform. The patient was treated for 15 minutes at a setting of 80 to 150 Hz. Acupressure point stimulation for pain management during acute exacerbations was another treatment used. In this procedure, electrotherapeutic point stimulation at a pulse per second of 1 to 4 Hz, direct current, and square wave formation was applied to acupuncture points B52, B23, B24, B25, B26, B27, B28, Gb30, Gb34, B60, B36, B37. B40, and B57 for approximately 10 seconds per point. Sacro Occipital Technique pelvic blocking to allow for a more gentle corrective measure to pelvic misalignment was used to manage the piriformis syndrome. In this treatment, the patient was lying prone. One block was placed under the patient's anterior ilium on the long leg side, whereas another block was placed under the patient near the anterior inferior iliac spine; and the patient was allowed

to rest in this position for a few minutes. CranioSacral therapy for greater myofascial release in the lumbar and pelvic regions was also applied. The patient was placed in the supine position. Light touch was applied to the lumbar and abdominal fascia for approximately 30 minutes to allow for a release of the pelvic diaphragm and lumbosacral decompression. An ergonomic evaluation was performed because the patient noted that sitting for prolonged periods tended to increase his discomfort. The patient's height of 76 in was thought to be a factor in his workstation discomfort. Chair modifications, the use of a footrest, and changes to the keyboard type and location were thought to be most beneficial for reduction of the patient's low back pain.

The patient discontinued care after 2 visits for this episode of piriformis syndrome. Because the patient ended his treatment before his estimated resolution of symptoms/reevaluation, no outcome assessment forms were completed; nor was a final orthopedic evaluation performed. Approximately 18 months later, he had another episode of piriformis syndrome. Again, he kept only 2 visits. When the patient presented for future episodes of low back pain, he remarked that he discontinued care for the piriformis episodes because he felt enough resolution of his symptoms. Since the second episode of piriformis syndrome, he has continued to have reexacerbations of his original low back pain complaint separated by approximately 1 to 4 months but has not had another episode with subjective complaints or objective findings suggestive of piriformis syndrome. These exacerbations were mostly associated with increases in travel, work hours, or stress and were successfully addressed with conservative management.

Discussion

This is an unusual case because the patient also has anomalous accessory bundles of the piriformis muscle. Initially, this anatomical variant was thought to be asymptomatic; but over the course of several years, the patient has experienced several episodes of symptoms that did appear to be due to the variant piriformis muscle and was considered a true piriformis syndrome. The patient has been managed successfully with conservative chiropractic care, although the underlying cause of the piriformis syndrome still exists.

To differentiate symptoms of piriformis syndrome from lumbar disk displacement and lumbar degenerative joint disease, the clinician can use several orthopedic tests. In general, these tests cause a stretch to the piriformis muscle and are considered to have a positive result if they reproduce symptoms into the buttock, thigh, and/or leg. The first of these, the Freiberg test/sign, involves passive internal rotation of the affected leg while the patient is supine.[3,4] A second is the Pace test/sign. This involves active resisted abduction and external rotation of the involved leg with the patient in the seated position.[3,4,10] A third is the Beatty maneuver/test, the result of which is positive if it produces buttock pain on the affected side when the patient lays on his or her side with the hips and knees flexed and the affected side up and then actively abducts the affected leg.[4,11] A fourth test, the FAIR test, is performed with the patient on his or her side with the affected side up. The patient flexes the hip to approximately 60° and the knee to 60° to 90°. The physician then stabilizes the hip and provides downward pressure to the knee causing adduction and internal rotation.[4]

The authors were unable to locate any studies that addressed management of a patient with accessory superior bundles of the piriformis muscle. One case study was found in which a patient was treated for posttraumatic piriformis syndrome with successful resolution of symptoms after treatment for 5 months.[12] There is another case study in which a sacroiliac joint dysfunction with associated piriformis syndrome mimicked an intervertebral disk syndrome.[13]

Limitations

The current case report is limited by the fact that it only involves one patient and can therefore not be applied to all cases of piriformis syndrome. A second limitation is a lack of objective outcome assessment measures. Because this patient has been treated for multiple conditions, the use of more detailed objective assessment tools was not practical, the patient discontinued care before his estimated release date, or the timing did not always correspond with the cessation of one complaint and the beginning of another. A third limitation is that the authors were unable to find any literature documenting the support for the use of the additional treatments provided for piriformis syndrome. Instead, the clinician's best judgment was used. Lastly, the authors note that no objective tests for neurological involvement of the sciatic nerve (eg, electromyography or nerve velocity conduction study) were performed on this patient.

Conclusion

This case study shows that even though an anomalous piriformis muscle exists, it may not be symptomatic. Even if it is not symptomatic at a given point of time, this type of anomaly does represent an altered biomechanic status and may put the patient at risk for a piriformis syndrome in the future. Although surgery is an option, this case shows that conservative chiropractic care may be an option for management of similar cases.

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